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General Notes.

GEOLOGY AND PALEONTOLOGY.

The Laurentian of the Ottawa District.—In a paper recently published by Mr. R. W. Ells, the author shows that certain modifications of the arrangement of the Laurentian strata as laid down in the geological map of Canada, 1866, must be made. While it is as yet hardly possible to estimate correctly the thickness of the strata, there is no doubt that it has been overstated. The Anorthosite masses north of St. Jerome which had been placed in the upper Laurentian have been shown by Dr. F. D. Adams to be of intrusive origin. The limestones in both the Trembling Mountain section and the region between the Anorthosite area and Gatineau River in nearly every case occupy well defined synclinals.

The succession of strata in ascending order as revised by Mr. Ells is as follows:

1. Reddish-gray gneiss without distinct signs of bedding.
2. Reddish orthoclase gneiss showing a well stratified arrangement of beds.
3. Grayish and rusty gneiss passing into a regular crystalline limestone.
4. A series of schistose rocks, highly metamorphic, described in earlier reports as the Hastings series.

In conclusion the author calls attention to the fact that under the present arrangement of the Laurentian of Quebec the parallelism with the rocks of the system as displayed in southern New Brunswick is very close. (Bull. Geol. Soc. Am., 1893.)

Relations of the Laurentian and Huronian Rocks North of Lake Huron.—This paper is an extension of one published by the author, Mr. A. E. Barlow, in 1890, and contains some further observations on the nature of the contact between the Huronian rocks of Lake Huron, described by Logan and Murray, and the Laurentian gneisses. As a result of his investigations, Mr. Barlow is convinced of the irruptive nature of this Laurentian gneiss and of its magmatic condition at a time subsequent to the petrification of the Huronian sediments. The following facts have led to this conclusion:— (1) The diverse strat-

igraphic relations of the two rocks along their line of junction. (2) The alteration of the sedimentary rocks along the line of junction. (3) The inclusion of angular fragments in the mass of the gneiss which are clearly referable to the adjacent sedimentary strata. (4) The occurrence of gneissic intrusions distinctly irruptive. (5) The absence of limestones, slates or quartzites, or any species of rocks indicative of ordinary sedimentation. (6) The general character of the rock itself. (Bull. Geol. Soc. Am., 1893.)

The Carboniferous Glaciers of Central France.—In a note on the geogeny and stratigraphy of the coal-measures of central France, M. A. Julien discusses the various problems to whose solution the key is given by the discovery of the glacial origin of the breccia in the coal-measures: (1) the cause of the glaciers of the coal-measures; (2) their centers of dispersions; (3) the direction of the glaciers for each basin; (4) the precise relative age of the breccia.

The cause of the glaciers is the elevation, at the beginning of the Upper Carboniferous period, of Alpine masses forming part of that chain which Mr. Marcel Bertrand designated, a few years since, the Hercynian chain. The formation of this chain caused the elevation of central and western Europe and displaced the carboniferous ocean as the Alpine chain, at the close of the Miocene epoch, expelled the Helvetian sea. In both cases these extensive orogenetic movements were accompanied by an enormous development of the internal activity of the globe resulting in the breaking out in Europe of that series of porphyritic volcanoes of the Permo-carboniferous epoch, and of trachytic and basaltic eruptions toward the close of the Tertiary. It is not, then, at all strange to find traces of Permian and Carboniferous glaciers since the conditions which produced the more recent glaciers were present also during those earlier periods.

With the aid of a careful lithological inventory of each basin, one can infer the height of the original mass, and the direction of the flow of the glaciers. For instance, those entering the basin of St. Etienne came from the north.

In regard to the relative age of the breccia, the author concludes that the Coal-measures of the basins of Epinac, Blauzy, Brassac, Langeac, Commentry, etc., are synchronous, that their formation has been simultaneous, and that they differ from each other only in having their upper beds more or less worn down by erosion.

M. Julien is thus led to synchronize, in spite of conflicting floral testimony stated by M. Grand 'Eury, the beds of Rive-de-Gier, Valfleury and Fouillouse, those of Epinac, Colombier, and Marais, at Commen-

try, of Combelle and of Chalède in the basins of Brassac and of Langeac all of which were in existence before the glacial formation in its maximum extension. For similar reasons, he synchronizes also the upper beds in the great sterile plain, such as those of St. Etienne, Grand-Moloy, and Sully, those of Blauzy, the upper bed of breccia of the Carboniferous terrain of Meaulne, and the beds of Brassac and of Marsange.

M. Julien also considers the extensive bed of Commentry parallel with the three divisions of St. Etienne (Revue Scientifique, Sept., 1893).

Quicksilver Ore Deposits.—An important paper by George F. Becker, intended for the use of mining engineers. The first section treats of data from observation, the second of theoretical inferences as to the transportation and precipitation of the ore and of the form of the deposits. In this connection the recent advances in the study of osmosis is pointed out. In closing, the author gives a brief résumé of recent developments in various parts of the world, in which he embodies the results of the investigations of Professor A. Schrauf on Idria and Mr. P. de Ferrari, on the mines of Monte Amiata.

Statistical tables accompany the paper compiled from Monograph XIII of the U. S. Geological Survey. (Extract from Mineral Resources of the United States, Calendar Year, 1892.)

The Discovery of Miocene Amphisbænians.—No fossil remains of Amphisbænians so far have been made known. Mr. J. B. Hatcher, so well known to paleontologists, had the good fortune this summer to procure two small Lacertilian skulls, in the White River Beds of South Dakota, which when shown to me, I at once recognized as belonging to the Amphisbænians. Professor W. B. Scott of Princeton College, for which Institution the collections were made by Mr. Hatcher, had the great kindness to allow me the publication of this very interesting find; and I give to-day a short description of the principal characters of the skulls, which will be followed soon by a full account with figures.

1. The larger skull, which measures 13 mm., from the middle portion of the condyle to the anterior end of the premaxillary, and 5½ mm. at its transverse diameter between the posterior ends of the maxillaries is so close to Rhineura Cope, from Florida, that I am not able to place it with the present material in another genus.

The nostrils are inferior in position. The single premaxillary is widely separated from the frontals by the large nasals, which are distinct, and extend to the border of the muzzle, overroofing the nostrils. The

prefrontal is large, placed between parietal, frontal, and maxillary, forming the superior border of the orbit; the jugal is exceedingly rudimentary, only connected with the maxillary; there is in all living Amphisbænians no postorbital arch. The squamosal is not free. One tooth on premaxillary, 6 pointed teeth on each maxillary. It is distinguished from the modern *Rhineura floridana* Baird, by the more slender form of the skull, and may be called *Rhineura hatcherii.*

2. The smaller skull measures only 10 by 5½ mm. It is at once distinguished from all living Amphisbænians by the presence of a postorbital arch, and the very peculiar prefrontal.

The nostrils are inferior in position. The single premaxillary nearly touches the paired frontals behind. Premaxillary, nasals, frontals nearly meeting in one point. The nasals are distinct and extend to the border of the muzzle, over-roofing the nostrils. Prefrontal very small, placed between maxillary and frontal; separated from the orbit by a descending process of the frontal, which forms the anterior border of the orbit. Jugal complete forming a distinct postorbital bar; it is in connction with maxillary, frontal, and parietal. Squamosal well developed and free. One small tooth on premaxillary and 4 on each maxillary.

This form represents a new genus and a new family of the Amphisbænians, which may be called HYPORHINA and HYPORHINIDAE. The species may be named *Hyporhina antiqua.*—G. BAUR.

Walker Museum, The University of Chicago.

On Symmorium, and the Position of the Cladodont Sharks.—In a paper recently read before the Philadelphia Academy I have described a shark from the Coal measures of Illinois under the name of *Symmorium reniforme.* The genus Symmorium is a Cladodont which differs from *Cladodus* Agass. in having the axial elements of the pectoral fin fused with each other and with the proximal basilar elements, into a single piece.

The specimens on which this genus is founded throw much light on the structure of the Cladodont pectoral fin, and through it, on the question of the evolution of this organ among fishes. The fin basis described is mostly well preserved, and clear as to details of structure. It confirms the characters ascribed by Traquair to the pectoral fin of a Cladodus from the Lower Carboniferous of Scotland,[1] the only important difference being that in the latter the metapterygium is dis-

[1]Geological Magazine, Feb. 1888, p. 82.

tinctly segmented, while in the Symmorium this element forms a single piece, except possibly at the extremity. According to Traquair there is an "oblong" proximal segment of the metapterygium "whose anterior portion seems to have absorbed the bases of one or two adjacent radials." In *Symmorium reniforme*, all the basals (radials of Traquair), are fused at their bases with the metapterygium. The basals are also more numerous than in Dr. Traquair's shark, for he says "some small radials are seen attached to the preaxial side of the first two segments—none on the others." My specimen agrees with Traquair's in the absence of basals (radials) from the post-axial side of the metapterygium, where indeed they are not to be looked for.

The structure of the paired fins here pointed out, sustains the views already announced by Dr. Bashford Dean[2] in a recent paper, and this author is to be congratulated that the view which he has put forth, is so fully sustained by the material in my possession. One hypothesis which he holds requires further confirmation; viz, that the metapterygium is formed by the fusion of the basal elements. The extensive fusion seen in the later genus Symmorium as compared with the earlier genus Cladodus, supports his position so far as it goes, but the origin of the primitive metapterygium is not thus explained.

My observations on Symmorium, together with those of Traquair, Jækel, and Dean, show that the median axis of the archipterygium is not propterygial or mesapterygial, but is metapterygial. This greatly simplifies the conception of the history of the Selachian fin, where the metapterygium supports the greater number of the other segments. It shows that the Ichthyotomi are not elements in the phylogeny of the sharks,[3] but form a side branch. It is further to be observed that the essential distinction now discovered between the metapterygial and other elements of the paired fins, must be maintained in our future studies of them. A clear distinction between baseosts and axonosts in the paired fins has been hitherto wanting. For the present it may be convenient to regard the metapterygial elements as axonosts, and those which have originally been branches of that axis, as baseosts. The scapular base of the Selachian fin consists then of one axonost and two baseosts. The typical Actinopterygian fin will have as its scapular base, according to Gegenbaur's homologies, baseosts only, the metapterygial (axonost) elements having entirely disappeared.

It results from the preceding observations that the Cladodontidæ must be removed from the Ichthyotomi where Dr. Woodward placed

[2]Transac. N. York Academy of Sciences, 1893, April, p. 124.

[3]See Proceeds. Am. Philos. Soc., 1892, p. 280.

them, and be relegated to his order of Acanthodii. The definitions of the three orders of Elasmobranchii derived from the fins, will then be as follows; those of the second and third being the same as given by me in the NATURALIST for 1889, (October, p. 854).

Paired fins ptychopterygial, *Acanthodii.*
Paired fins archipterygial, *Ichthyotomi.*
Paired fins basilo-metapterygial, *Selachii.*

The term ptychopterygium is introduced to describe the paired fins of the Acanthodii, in which the basilar or radial elements spring directly from the body wall; the axial elements when present, being within the body wall. This structure is primitive, and sustains the view of Thacher, that the paired fins have originated from a lateral fold.—E. D. COPE.

Geological News.—Paleozoic.—During a recent geological exploration in the neighborhood of Mount Lambie in New South Wales, Messrs E. F. Pittman and T. W. E. David found several specimens of *Lepidodendron australe* in rocks of true Devonian age. This is an interesting discovery since, although surmised, it is a fact which has not hitherto been proved. (Proceeds. Linn. Soc., N. S. W., 1893.)

Among the important recent discoveries is that of fine larval trilobites in the Lower Helderberg formations south of Albany, New York. These specimens are referred by C. E. Beecher to the genera Acidaspis and Phaëthonides. They represent early stages of these genera when the animals had no thoracic segments, and when the separation between the cephalon and pygidium was not distinctly marked.

As a result of the study of these forms Mr. Beecher is confirmed in the idea suggested by Woodward and Edwards that the Trilobita may be considered as ancient or protoisopods. (Am. Journ. Sci., Aug., 1893.)

——According to Mr. C. S. Prosser the fossiliferous zone underlying the Oneonta sandstone in Chenango and Otsego Counties, New York, is not the top of the Hamilton but belongs in the Portage stage. The writer bases his opinion on faunal data. (Am. Journ. Sci., Sept., 1893.)

Mesozoic.—A femur found in 1838, at Slingaby, Yorkshire, has recently been identified by Dr. Seeley. He refers it to a small species of Omosaurus with the specific name *phillipsi.* This is the third species of this genus found in England. (Yorkshire Philosph. Soc. Report, 1892.) Mr. R. T. Hill has published a list of the invertebrate fossils collected or obtained by him from the beds of the Trinity Division in Arkansas and Texas. Of the 34 Mollusca described, 12 represent new species. The families of Foraminifera, Echinodermata, Vermes, Mol-

luscoidea and Arthropoda have one species referred to each, of which the first only is known; the others are either indeterminate or new. (Proceeds. Biol. Soc Wash., 1893.)

The jaw of a new carnivorous Dinosaur from the Oxford Clay of Peterborough, Eng., is figured and described by Dr. Lydekker in the Quart. Journ. Geol. Soc., Aug., 1893. It is of large size and solid structure, and appears to be nearly allied to the Thecodontosauridae. It differs from the described genera of that family by the marked deflection of the mandibular symphysis. Dr. Lydekker accordingly refers it to a new genus under the name *Sarcolestes leedsii.*

Professor T. R. Jones notes the discovery of 15 fossil Ostracoda, 13 of which are new, from the Upper Cretaceous series of Wyoming and Utah. Nearly all represent either fresh water or estuarine forms. Professor Jones has described and figured these interesting specimens in the Geol. Mag., Sept., 1893.——At a recent meeting of the London Geol. Soc., Mr. E. A. Walford described some forms of Bryozoa from the spinatus zone of the Middle Lias near Banbury, Eng. The new material shows the opercular aperture, and the opercula *in situ* with appendages and supraoral ovicells characteristic of the Cheilosiomata. In addition he found giant cells (cistern cells) of form quite dissimilar from the ordinary zooecia and probably reproductive. The name Cisternophora is suggested for the genus of which several forms were described (Geol. Mag., Aug., 1893.)

Cenozoic.—Captain F. W. Hutton questions the propriety of the name, *Dinornis queenslandiæ*, given by C. W. DeVis in 1884 to a struthious femur found at King's Creek, Darling Downs. Captain Hutton is inclined to refer the fossil in question to the Casuariidæ since it possesses the posterior projection of the trochanterial surface, a character lacking in the Dinornithidæ and Apterygidæ, but present in the femora of both the Cassowary and the Emu. (Proceeds. Linn. Soc., N. S. W., 1893.)

The skull of a Lemuroid mammal found in the shell-marl in the south-west coast of Madagascar has been determined by Dr. Forsyth Major to be that of a gigantic Lemurid related to the extinct genus Adapis as well as to the existing Lemurids. The brain-case is small, the thickening of the bones of the skull is very remarkable. The tritubercular molars and premolars approach closely some Malagasy Lemurids. Dr. Major names this new form *Megaladapis madagascariensis.* (Proc. Roy. Soc., 1893.)